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Oberlin College is fortunate in coming into the possession of the extensive collection of plants made by Dr. Beardslee, of Painesville, Ohio.—In an important paper read before the American Philosophical Society, Oct., 1883, and printed May 12, 1884, John C. Branner discusses the course and growth of the fibro-vascular bundles in palms. He reviews at length the various theories which have been held as to the course of the bundles in the palms, a subject well known to be surrounded by many difficulties. The discussion is based upon direct personal observations and study of a large number of specimens of no less than seventeen different genera.—The long looked-for Manual of Mosses, by Lesquereux and James, has at last been issued by Cassino & Co., of Boston. An adequate notice will appear soon.—Wm. Boott describes several new sedges in the June *Bot. Gazette*.—In the same number the announcement appears that Professors Coulter and Barnes are engaged in a special study of the North American species of the genus *Cyperus*, and desire to receive specimens. "Loaned specimens will be retained for as short a time as possible, and carefully returned."—The "Questions on botany," prepared by Professor Spalding for the use of students who have attended the general lectures on botany delivered in the departments of pharmacy and medicine in the University of Michigan, indicate that in another of our medical schools the importance of biological botany is fully realized.—Mr. R. M. Christy read a paper recently before the Linnean Society of London on the power of penetrating the skins of animals possessed by the seed of *Stipa spartea*. "Inquiry among butchers and others showed conclusively that large numbers [of these seeds] were often found beneath the skin of sheep, especially about the shoulders." This grass is abundant in the Mississippi valley (where it is known as Porcupine grass), and we have been familiar with it for years, but have never before heard of its penetrating the skins of animals. Has this been noticed by NATURALIST readers?

ENTOMOLOGY.

LIFE-HISTORIES OF SOME GEOMETRID MOTHS.—These and other unpublished notes on Lepidopterous larvæ have been prepared in connection with work on our forest trees done for the Entomological division of the U. S. Department of Agriculture, and to be incorporated in the fifth report of the U. S. Entomological Commission.

Aplodes coniferaria, n. sp.—We have reared six moths from curious 14-flapped larvæ found feeding in August on the fir and hemlock, and described in Bulletin VII, U. S. Ent. Comm., p. 238, and referred by us to *Aplodes*. The caterpillar is dull brick-red, with seven pairs of broad dorsally situated flat flaps on each side. It bears a striking resemblance to the small reddish twigs of the fir with the leaf scars.

From the 4th to the middle of September the caterpillars made, between the twigs, a loose, slight, open cocoon of bits of small twigs and leaves, held together by silk, within which the pupa rested through the winter.

The pupa is of the usual form, rather slender, brown, the abdomen bright brick-red above between the wing-covers; the end horn-brown and mottled; there is a blackish dorsal line and a dark stripe along the antennæ and veins of the wing, the branches being spotted with black. In another specimen the wing-covers were red and the body, including abdomen, horn-colored; the terminal spine is short, moderately stout, with eight unequal curved slender spinules. Length 9-10^{mm}.

Walsh's description of the larva of *Aplodes mimosaria*, which he bred from the oak, is too brief for comparison, but our specimens do not disagree with his diagnosis, though we have never found it on the oak, but frequently on the coniferous trees mentioned.

Six specimens, two of them males, issued from the chrysalids in the breeding box, in Providence, between April 20th and 25th. They were all of uniform size, the wings expanding about 25^{mm}. They differed but slightly from *A. mimosaria* though much smaller; compared with one of the latter the hind wings are more angulated, while the outer white line on the same wings is less bent in the middle. The lines on the fore wings are as in *A. mimosaria*, but vary in distance apart. The head and abdomen are marked as in *A. mimosaria*; the male hind tibiæ are as in that species. It differs decidedly from the two other species of its size, *A. approximaria* and *latiaria*.

On sending specimens to Mr. J. A. Lintner, to compare with his types of the species in his possession, he kindly writes as follows:

"Differs from *mimosaria* in the outer line of front wings being nearer to the margin, and the inner line being angulated on the submedian instead of curved. The outer line of secondaries is nearer to the margin than in *mimosaria*, and is more regular.

"It approaches nearer to *latiaria*, but the two lines are more approximate, and the inner line is more angulated on the submedian. It also has an inner line on the secondaries which *latiaria* has not."

Endropia textrinarum.—The caterpillar was found on the white oak at Providence, Oct. 7th. The body is rather slender, the head wider than the segment behind, rounded, rather deeply bilobed, swollen on each side of the apex of the clypeus; the latter edged with dark brown, forming a V-shaped line on the front of the head. The prothoracic segment is normal, while the mesothoracic segment is much swollen on each side, the rounded swellings connected by a dorsal curved ridge. On the metathoracic segment is a small transverse ridge, next to that on the meso-seg-

ment. On the hinder part of the 3d abdominal segment is a large double dorsal dark knob-like hump. On the 6th is a conspicuous dark transverse rounded ridge, enlarged and higher at each end. The 8th segment has large warts, and there are also large warts on the sides of segments 7-10. The supra-anal plate is triangular but short, with four hair-bearing warts above and four at the end. Anal legs large and broad. The short penultimate segment has a transverse row of eight large warts; these warts are obsolete on the front half of the body.

The body is of exactly the color of an oak twig, being dark gray shaded with light, and of the same color beneath as above; while the knotted appearance of the segments behind the head and in the middle of the body assist in the deception, the caterpillar being remarkably like a bit of oak twig. The anal conical dorsal tubercles are large and distinct.

Oct. 10 it began to spin a thin slight web at the bottom of the breeding box, and the pupa appeared Oct. 12.

The pupa is 15^{mm} in length, light horn-brown, the wing-covers dull brick-red; antennæ and limbs striped with black. The spiracles are prominent and black. The terminal spine ends in two long slender straight sharp acute spinules.

The moth appeared in the breeding box in May.

Paraphia deplanaria.—The caterpillar of this moth was found at Brunswick, Me., June 23d, on the fir. The body is cylindrical with no tubercles, and in color and appearance like a bit of a fir twig. Head rounded, somewhat bilobed, greenish, mottled and finely spotted, especially on the vertex on each side, with reddish-brown. Body reddish-brown, washed with greenish, and with a row of lateral irregular dark blotches. Length 22^{mm}.

The pupa was found June 28, and is of the usual dark tan-brown color, rather stout; the moth appears about July 8-10.

Tetracis lorata.—The moth was bred from a large twig-like caterpillar found on the hemlock at Brunswick, Maine, Aug. 25. Head flattened, square in front but not notched, slightly full on each side of a slight median impressed line. Pale gray, with a diffuse straight vertical band on each side, the middle being clear whitish gray. These dark latero-frontal bands and the pale gray median band are continued on to the prothoracic segment. The median whitish band is continued on to the meso-thoracic segment, but forms there two linear parallel white thread like lines enclosing a linear brown median line; on each side of this ring, directly behind the prothoracic spiracle, is a large rough tubercle; the granulations coarse and prominent; white on the sides, above tawny-brown. On the 1st and 2d abdominal segments is a pair of swollen infra-spiracular rounded tubercles, concolorous with the body. The body is dull reddish-brown. The two piliferous warts are connected and converted into a transverse tubercle, becoming larger towards the 5th abdominal segment; the

tubercles behind rather large but not connected. From the 5th abdominal segment to the end of the supra-anal plate extends a black median line. Along the sides of the abdomen, on segments 2-5, is a lateral raised short brown line edged below with pale gray; these are situated in front of the spiracles. Below are three large tubercles on each segment, and there is a tubercle beneath. Hence the caterpillar represents a large rough twig, with leaf-scar-like tubercles. Anal plate sharp, triangular, tuberculated. Anal legs large. Length 38^{mm}.

The pupa is rather thick; the body in front, including the wings, horn-brown, speckled with blackish; abdomen reddish-brown. Spiracles distinct black. Terminal spine large, ending in two long straight acute spinules. Length 17^{mm}.

The moth appeared in the breeding box April 25. *Tetracis crocallata* feeds on the sumac, according to Mr. Saunders.

Metanema quercivoraria.—This was raised from the oak, but the larva unfortunately not described. The pupa is rather slender, reddish horn-brown; spine acute, large and flat. Length 13^{mm}. The moth issued May 3. Several were taken at Keene Flats, Adirondacks, June 12, in a locality where no oak trees were seen.—A. S. Packard.

BOMBUS PLUNDERING DIFFERENT SPECIES OF PLANTS.—On page 20 of Mr. Ogle's translation of Dr. Kerner's interesting treatise on "Flowers and their unbidden Guests," the author, after discussing the fertilization of the European species of *Pedicularis* by *Bombus montanus*, says: "It appears that the humble bees always devote themselves at one time to the plunder of one species of plants," to which the translator adds: "It is curious that a similar observation as to the habits of bees should have been made by Aristotle, 'a bee,' he says (H. An., ix, 40), 'on any one expedition does not pass from one kind of plant to another, but confines itself to a single species, for instance, to violets, and does not change until it has first returned to the hive.'"

In the light of the above, a few observations I have recently made on the subject may be of interest. In five instances I saw a large species of *Bombus* fly from the flowers of the common lousewort (*Pedicularis canad. nse*) to those of the vetch (*Vicia americana*) and *vice versa*. In another instance a *Bombus* went from a blue hyacinth (*Hyacinthus orientalis*) to a columbine. Another went from the flowers of a small Solomon's seal (*Polygonatum biflorum*) to dandelion. Another was working on vetch, from which it flew to the flowers of a trumpet honeysuckle (*Lonicera*), thus visiting in succession flowers belonging to three different families, and of three different colors.—Clarence M. Weed, Mich. Agri. College.

EXAMINING THE HEADS OF INSECTS, SPIDERS, &C., ALIVE.—Mr. E. T. Draper recommends a cone of pasted paper to be made

rather larger than the specimen, with the apex cut off. A vigorous spider will soon project its head through the aperture; when in this position it should be blocked behind with cotton or wool slightly wetted. The cone can then be gummed to a slip, apex upwards.

Many insects can be arranged in the same way for the observation of facial movements, and such front views admit of interesting and extended study; the action of the antennæ, palpi and various organs of the mouth may be watched and curious effects produced by the excitation of saccharine or nitrogenous juices, administered from the tip of a sable pencil.—*Journ. of the Royal Micros. Soc., April, 1884.*

ANATOMY AND FUNCTION OF THE BEE'S TONGUE.—In a paper read before the Linnean Society of London, Mr. F. J. Briant remarked that authorities are yet divided in opinion as to how the organ in question acts. Kirby and Spence, Newport and Huxley aver that the bee laps its food; while Hermann Müller and others attribute a full share to the terminal whorl of hairs to which the honey adheres, and therefrom is withdrawn. Mr. Briant, on the other hand, from experiment and study of the structures, is inclined to the view that the honey is drawn into the mouth through the inside of the tongue by means of a complicated pumping action of the organ, aided by the closely contiguous parts.

We might add that Réaumur states that the bee does not suck up the liquid sweets but laps them up with its long slender hairy tongue. A better view than Mr. Briant's is, it seems to us, that of Shuckard, quoted in our "Guide to the Study of Insects."

ENTOMOLOGICAL NOTES.—The number last issued of the Transactions of the American Entomological Society, the first of Vol. XI, is no less valuable than its predecessors. It contains Dr. S. W. Williston's tables, or rather synopses, of two groups of the North American Asilidæ, illustrated by two plates, with an account of a new genus of Syrphidæ. Our Asilids are but little known. There are three subfamilies, the Dasypogoninæ, comprising thirty-five genera and one hundred and twenty-five species; the Laphrinæ with eleven genera and fifty species, and the Asilinæ. The latter group is little known. W. Ehlers, of Spain, describes two new blind Bembidii, one from St. Thomas, West Indies, and the other from Florida. Mr. Frank Aaron describes and figures new species of Psocidæ from near Philadelphia, among them a brown variety of *Atropos divinitaria*, and a new form, *Atropos purpurea*; also a new genus, *Dorypteryx* (*D. pallida*). A useful synopsis, with a plate, of the North American Apioninæ, a subfamily of weevils, is published by Mr. John B. Smith. The Cucujdæ of America north of Mexico are revised by Lieut. Thos. S. Casey, U.S.A. The article is illustrated by four plates.—Among the other good articles in the *Canadian*

Entomologist for April is one on "the survival of the fittest" among certain species of *Pterostichus* as deduced from their habits, in which Mr. J. Hamilton gives some facts bearing on the extinction of species of these ground-beetles in the vicinity of large cities. Of the sixteen species mentioned four must soon become extinct, and six may possibly exist in the future as rarities, four will occur not uncommonly, while two (*stygius* and *lucublandus*) will remain as now, common.—Under the caption "La feuille qui se transforme en insecte," M. Preudhomme de Borre figures the larva of a singular mimetic form of Orthoptera (*Charadodis rhombicollis* Latr.) from Quito, which is popularly supposed to change into a leaf.—*Zeitschrift für wissenschaftliche Zoologie*, for June 27, contains a lengthy article, with numerous illustrations, on the adhesive apparatus on the tarsal joints of insects, by G. Simmermacher, to which we shall again refer.—Mr. Hulst's monograph of the genus *Catocala* is apparently completed in the third number of the Bulletin of the Brooklyn Entomological Society. It contains a brief synopsis of the species, filling four closely printed pages; then follows synonyms and descriptions of the species, the latter rather too brief, but yet comparative. While the paper hardly fulfills the requirements of a monograph it is an excellent synopsis.—In his "Contributions à l'histoire des métamorphoses des Longicornes de la famille des Prionidæ," M. Aug. Lameere describes and figures the pupa of *Parandra polita* Say.—A case of development of the imago in an ichneumonid pupa is recorded in the *Entomologists' Monthly Magazine* for July, by A. F. Griffith, who, in a pupa of *Tæniocampa*, found that "the moth had apparently died, as so often happens, when just ready for emergence, but within the body was a parasite alive, also just ready to emerge."

ZOÖLOGY.

STRUCTURE OF THE OTOCYSTS OF WORMS.—M. E. Jourdan's investigations were made upon the small *Arenicolæ* of the coast of Marseilles and in the laboratory of that place.

By sectioning the cephalic segment of an *Arenicola* previously fixed by the injection of a solution of osmic acid of 0.50 per cent, the auditory capsules were shown in some sections and easily recognized by their little calcareous corpuscles. The otocysts are situated in the thickness of the integuments, far from the hypodermis and in the midst of muscular bundles; they are fixed by the connective envelope of these bundles, which surrounds them. They are not in direct contact with the œsophageal commissures, but connected with them by several nerves. They are placed towards the dorsal surface.

The nerve fibers composing the commissure and the brain are very fine and striated longitudinally. Nerve-cells exist throughout the length of the commissure, some in its interior, but a much